A NEW FOSSIL BRUCHID GENUS AND ITS RELATIONSHIPS TO MODERN GENERA (COLEOPTERA: BRUCHIDAE: PACHYMERINAE)

By JOHN M. KINGSOLVER[1]

The study of most fossil beetles is difficult because of the fragmentary nature of many of the representative specimens. Only amber and calcareous nodules preserve specimens so that they may be observed from all angles. In most fossil beetles, the specimen is usually an impression of a crushed, often disarranged, individual or fragments of an individual which must be observed as is, without recourse to a more convenient or more advantageous view, to observe details of structure. Morphological characters necessary to place the specimen in a genus or even in a family are often indistinct or missing; thus, its placement becomes a matter of the experience and background of the worker in his observations of habitus of a wide range of families and genera of Coleoptera. The classification of fossil beetles can probably never become as exact and definitive as that of extant beetles; consequently, fossil genera and species should be judged by different standards than recent taxa. A species based on an elytron or on another part of the body usually lacks essential characteristics for generic placement or association with other species. The profusion of species names resulting from past descriptions of this type should be regarded merely as an index to specimens rather than as a like number of species entities in the biological sense.

Rarely does a worker have the good fortune to observe a series of fossils from the same bed, with common characteristics in sufficient detail to permit the construction of a fairly detailed description of a taxon. Yet, such an opportunity presented itself recently during the examination of a number of fossil impressions of Bruchidae from the H. F. Wickham collection in the U. S. National Museum. Imprints of 15 specimens, preserved in various positions, were observed to have certain common features which linked the entire series. A discussion of these characteristics follows the description. Because differentiating characteristics of species of modern Bruchidae often rest in the male genitalia and because insufficient detail is present in these fossil impressions to distinguish "species," I feel that the best course to take with the present specimens is to assume that the type species, the described species listed below, and the series examined, which contained both identified and unidentified specimens, are representative of an apparently extinct new genus, which is described herein for comparison with modern Bruchidae.

The following descriptions are written as though the actual insects were being observed although details of the surfaces in the fossils are negative impressions of the original specimens.

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[1] Entomology Research Division, Agr. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

Oligobruchus Kingsolver, NEW FOSSIL GENUS

Colors are not preserved in Florissant beetles and there are no indications of pattern either in the integument or in the vestiture of these specimens.

Head: Eyes apparently deeply emarginate, facets not evident; vertex finely punctate, frons more coarsely punctate; vertical interocular carina distinct. Details of mouthparts not visible. Antennal segments serrate (preserved in part in only one specimen).

Prothorax: Disc coarsely, very densely foveolate (impressions in fossils coarsely and densely granulate in appearance); vestiture not apparent; no distinct asperities evident on disc, which appears to be somewhat saddlelike and not expanded laterally; posterior margin of disc not markedly lobed, apparently evenly arcuate; fine submarginal groove present on disc in two specimens; lateral carina excellently preserved in two specimens and not prominent nor elevated. Venter finely and densely punctate; prosternum moderately long before coxae, intercoxal process very narrow; coxae moderately elongated; trochantinal fossae well preserved in two specimens; post-coxal region obliterated. No specimens had anterior legs preserved.

Mesothorax: Scutellum well-marked in only one specimen, quadrate, slightly longer than wide, perceptibly emarginate at apex. Elytra separately rounded at apices, surface without evident asperities; striae 10, well-defined, regularly placed with elongate, nearly confluent punctures, interspaces not punctate, tenth stria reaching to apical third; no evidence of basal amalgamation of striae nor of basal carinate tubercles or basal strial teeth. Mesopleuron with epimeron and episternum of nearly equal size, pleural suture dividing them diagonally. Mesosternal area trapezoidal with intercoxal process flat, mesocoxae well separated; post-coxal ridge evenly arcuate parallel to posterior margin of coxal cavity; trochantinal fossa distinct in one specimen; surfaces of pleural and sternal areas finely and densely punctate. No specimens with mesothoracic legs preserved.

Metathorax: Flight wings not exposed in any of the specimens. Pleural and sternal areas not especially modified. Parasutural sulci present on each side of pleurosternal suture which separates metepisternum and metasternal region, the sulcus on episternum curving dorsad parallel to anterior margin of sclerite and sulcus on sternal sclerite curving mesad to meet posterior margin of post-coxal ridge of mesothoracic coxal cavities. Median sulcus of sternal area not evident in any of the specimens. Metathoracic coxae about twice as long as wide. Metathoracic trochantin well preserved in several specimens. Metathoracic femur strongly swollen, about 1.5 times as long as wide, outer ventral margin finely serrate but no other dentation evident. Tibia strongly arcuate parallel to ventral profile of femur, bicarinate on outer face, apex acuminate; details of terminal tibial spurs (if any) and of tarsal segments obliterated.

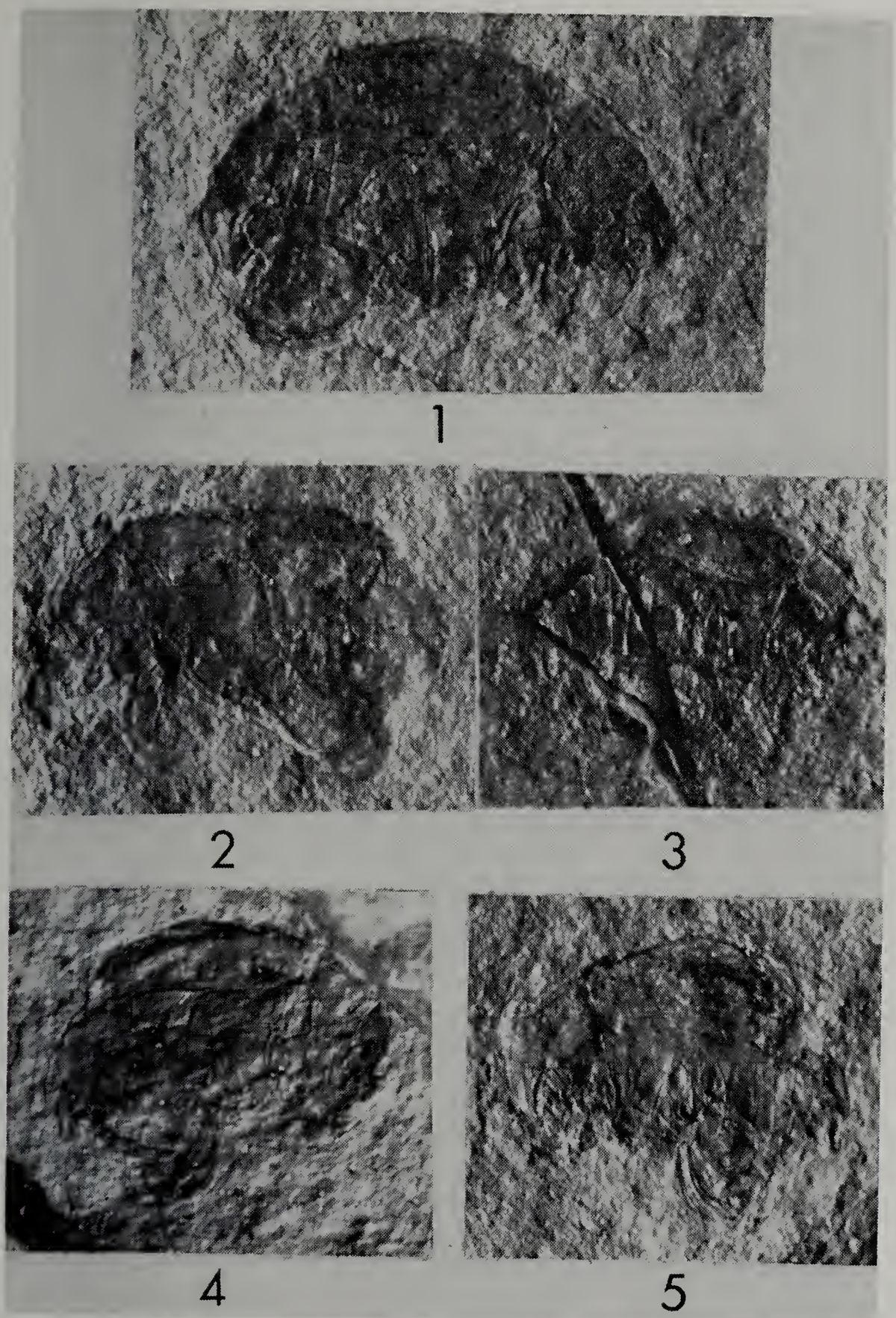
Abdomen: Short, rather stocky, with 5 visible abdominal sternites, last sternite shallowly emarginate (evidently males) in two specimens; pygidium finely, densely punctate, broadly triangular in outline (apparently only the pygidium is sclerotized with the two preceding terga membranous, which distinguishes it from *Kytorhinus* Fischer); intercoxal process acutely triangular.

Length of body excluding head: 3.5 to 4.5 mm.

The size suggests a beetle of about the dimensions and form of *Algarobius prosopis* (LeConte) although the preserved details of structure are quite different from that genus and species.

Type-species here designated: *Bruchus florissantensis* Wickham, 1912: 30-31.

The following additional fossil species are tentatively placed in *Oligobruchus* pending examination of type specimens: *Bruchus scudderi* Wickham, 1912:31, *Bruchus haywardi* Wickham, 1912:31-32, *Bruchus wilsoni* Wickham, 1913:9-20, *Bruchus submersus* Wickham, 1914:481, *Bruchus*



FIGURES 1-5, *Oligobruchus,* new fossil genus. 1—*O. florissantensis* (Wickham). 2—*O. haywardi* (Wickham). 3—*O. scudderi* (Wickham). 4 and 5—*O. florissantensis.* All specimens determined by Wickham. (Photographs by Jack Scott, Smithsonian Institution.)

primoticus Wickham, 1914:480-481. Their placement here is based on descriptions and illustrations in the literature, and on specimens in the U. S. National Museum identified by Wickham as follows: *Bruchus florissantensis*—3, *Bruchus* near *florissantensis*—1, *Bruchus haywardi*—2, *Bruchus scudderi*—4. Five additional specimens which I regard as *Oligobruchus* sp. completed the study series.

Wickham's illustration of *primoticus* (pl. 14, fig. 1) shows five denticles on the lower margin of the hind femur. I have not seen the specimen, but it is possible that their presence indicates dentation of the mesal carina of *Oligobruchus,* which was missing in every specimen I examined. In only two specimens was a finely serrate lateral carina evident. Wickham also illustrated a serrate antenna for *primoticus* similar to that in the only specimen I examined with an antenna retained. It is significant that this antenna is also similar to the antennae in *Pachymerus* Thunberg.

Discussion of Relationships

The generic description is based on a series of 15 specimens selected because they were preserved in various positions yet share at least one of five significant morphological characters. Eight of the specimens have all 5 characters and 11 have at least 4. These specimens serve to associate the entire series, some of which were not preserved in a favorable position to exhibit more than one or two of the characters.

Common to all of the specimens is a densely foveolate prothoracic disc (fig. 1), which to my knowledge is not developed to this extreme in any of the modern Bruchidae, but is approached to some degree in certain species of *Pachymerus*.

Next in frequency of occurrence is a strongly arcuate metatibia with a bicarinate lateral face (fig. 4). This character is found in 13 of the 15 specimens. This specialization of the tibia is present in both of the subfamilies Pachymerinae and Bruchinae, in the latter in species groups near *Caryedes* Hummel. However, the deeply foveolate prothorax and the parasutural sulcus (explained below) are never found in the latter subfamily.

Concurrent with the arcuate metatibia in modern Bruchids is a strongly inflated metafemur (figs. 1 & 4). Eleven of the 15 fossil specimens possess a partial or complete impression of this type of femur.

In most of the Pachymerinae and Amblycerinae in the Bruchidae and in many of the primitive Chrysomelidae and Cerambycidae, the pleurosternal suture of the metathorax is paralleled on either side by a narrow but distinct sulcus which I am calling the parasutural sulcus. The sulcus on the metasternal sclerite joins the post-coxal ridge of the mesocoxal cavities and the sulcus of the episternum curves antero-dorsad to parallel the anterior margin of this sclerite, then bends dorsad still further and ends near the dorsal margin of the episternum. Nine of the 15 fossils show very clearly the impression of this sulcus (figs. 4 & 5).

It is unfortunate that more details of the head, antennae, and legs are not better preserved in these fossils. In these body area, in extant Bruchidae, are found several critical characteristics which, if known in the fossils,

might help in determining more precisely the relationships of the fossil genus. *Oligobruchus* undoubtedly belongs in the subfamily Pachymerinae, but I know of no described genus or of any species which possesses the peculiar combination of characteristics manifest in this series of fossil Bruchidae. In the key to the genera of Bruchidae of the United States (Bridwell, 1946:53), *Oligobruchus* would key to *Caryobruchus* from which it may be distinguished by characters given below. Perhaps the nearest extant relatives are *Caryopemon giganteus* Pic, *Caryedon languidus* (Gyll.) and various species in the genus *Pachymerus*. All of these taxa have in common with *Oligobruchus* the swollen hind femur, carinate frons, strongly arcuate hind tibia bicarinate on the outer face, parasutural sulci (at least in the species listed above and in *Pachymerus*), submarginal groove on the prothoracic disc, subequal mesepisternum and mesepimeron and the unmodified striae of the elytra.

Oligobruchus can be distinguished from *Caryopemon* Jekel by the following: In *Oligobruchus,* the posterior margin of the prothoracic disc is evenly arcuate and the disc is densely foveolate, the scutellum is subquadrate, the pygidium is broadly triangular, and the intercoxal process of the abdomen is acutely triangular, while in *Caryopemon,* the posterior margin of the prothoracic disc is deeply and broadly lobed mesally and sparsely punctate, the scutellum is triangular, the pygidium is vertically narrowed and the intercoxal area of the abdomen is broadly rounded. A character shared by these two genera and peculiar to them in this subfamily is the saddlelike prothoracic disc with its weak lateral margin.

Both *Pachymerus* and *Caryedon* Schoenherr are distinguished from *Oligobruchus* by their expanded prothoracic margins, sparsely punctate prothoracic disc, and shallowly emarginate eyes, all apparently being primitive Pachymerine characters.

The other two Pachymerine genera, *Caryoborus* Schoenherr and *Caryobruchus* Bridwell, lack the carinae on the metatibia found in *Caryedon, Caryopemon, Pachymerus* and *Oligobruchus* but share the absence of carinae and many other characters with *Amblycerus* Thunberg, another very primitive genus in the subfamily Amblycerinae. This condition may indicate that a smooth external face is a primitive character in the Bruchidae and that a carinate face is derived. The carinate condition is very common in this family.

In none of the extant Pachymerine genera is the prothoracic disc as densely and deeply foveolate as in *Oligobruchus*. The foveae in the latter genus are very deep and rounded and so closely approximate that the interspaces are carinate.

Characteristics possessed by *Oligobruchus* which I deduce to be primitive are the submarginal groove of the prothoracic disc, parasutural sulci of the metathoracic sclerites, swollen metafemur and correspondingly arcuate metatibia, subequal mesepimeron and mesepisternum, and the unmodified striae of the elytra. (Specialized modifications of the striae in Bruchidae include basal coalescence, basal asperities and denticles, or loss of one or more striae or parts of striae.) Specialized characters are the strongly convex saddlelike pronotal disc, narrow prosternal process, carinate meta-

tibia, and deeply emarginate eyes. The strongly foveolate prothorax is probably also specialized.

Comparison of *Oligobruchus* with other genera suggests that it was representative of a phyletic line, probably now extinct, arising near the origin of the line or lines leading to the modern genera *Caryedon* and *Pachymerus*. Although it possesses many primitive characters already deduced from the study of the extant genera in Bruchidae and other families, there has developed in its evolution a combination of specialized characters sufficiently different from those found in the other groups to warrant its erection as a new fossil genus.

Food Habits

A comparison of the food plants of the extant Pachymerinae with the plant genera listed from Florissant by MacGinitie (1953) indicates little difficulty of correlation. Species of the modern genera *Caryoborus* and *Caryobruchus* breed exclusively in palm seeds, species presently placed in *Pachymerus* attack seeds of palms or legumes, and species of *Caryedon* and *Caryopemon* live exclusively in legumes, the plant family which is host to most of the species of Bruchidae in the world. MacGinitie found no representatives of the Palmaceae in his study but did list nine genera of Leguminosae, five of which are modern. It is quite possible that the host plant of *Oligobruchus* was a legume.

Comparisons of Climate

The climate in Florissant times is said by MacGinitie (1953) to have been "sub-humid and warm temperate, not unlike the present climate of Monterrey, Mexico." This statement concurred generally with the conclusions of James (1939) concerning the Florissant Diptera.

The modern representatives of the Pachymerinae are distributed almost entirely in subtropical regions; thus, there seems to be no discordance in the climatic distribution of the Florissant *Oligobruchus* and that of the modern representatives of the Pachymerinae.

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